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# DETERMINANTS AND TRENDS OF POPULATION POVERTY IN THE SCANDINAVIAN AND BALTIC COUNTRIES

UDC / UDK: 364.662(48+474)

JEL classification / JEL klasifikacija: I31, I32, H53, C33

<https://doi.org/10.17818/EMIP/2025/40>

Preliminary communication / Prethodno priopćenje

Received / Prilmljeno: April 18, 2025 / 18. travnja 2025.

Accepted / Prihvaćeno: August 25, 2025 / 25. kolovoza 2025.

### ***Abstract***

*The "Sustainable Europe by 2030" initiative aligns with the United Nations' Sustainable Development Goals (SDGs) and focuses on various aspects of poverty, including income poverty, social deprivation, and labour market participation. Research on poverty trends in countries with average or above-average incomes is limited, but recent socio-economic changes and the ineffectiveness of anti-poverty programs in these regions highlight the need for such studies. This research employs regression analysis models using panel data, specifically the Ordinary Least Squares and Fixed Effects Models, to estimate the marginal effects of changes in population poverty and the contributing factors. The study found that despite the faster economic growth in the Baltic countries, a decrease in long-term unemployment, and an increasing number of individuals with higher education, these factors did not lead to lower poverty levels than those in Scandinavian countries. Effective poverty reduction in the latter group can be attributed to health and social security policies aimed at reducing poverty, as well as lower income inequality.*

***Keywords: at-risk-of-poverty-rate, at-risk-of-poverty-gap, severe material deprivation, panel data***



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## 1. INTRODUCTION

In the last century, the income of the population in the poorest countries has increased, and global levels of extreme poverty were more than halved by 2015. However, the COVID-19 pandemic has halted the progress in reducing poverty, leading to a slowdown in poverty reduction and weak global economic growth. In 2020, the number of people living below the poverty line increased by more than 70 million, the largest one-year increase since global poverty monitoring began in 1990. Currently, more than 3 billion people, or almost half of the world's population, live on minimum daily income, according to the World Bank (2022). Additionally, poverty is now defined not only by a lack of necessary income, but also by deprivation in various aspects of life, such as the inability to afford essential services, and goods, and cover unforeseen but necessary expenses. Poverty as a multidimensional socio-economic phenomenon is being studied by global and national organizations like the United Nations, the World Bank, and social policy-making institutions of individual countries, which continually seek effective ways to reduce it.

However, the scientific literature mostly analyzes the poverty problems of countries whose population receives low or moderately low incomes. Poverty and its changes in the population of countries with average or higher than average incomes (many European Union countries are classified as such) are less studied, but the socio-economic changes taking place in these countries in recent decades show the importance of such studies. As stated by Mussida&Sciulli (2022), "despite the intentions of the Europe 2020 Strategy, anti-poverty programs did not effectively fight the vicious cycle in which poverty itself may determine future poverty".

This study aims to analyze the long-term impact of factors contributing to poverty from 2005 to 2021 in Scandinavia and the Baltic countries. This will be done through panel data regression analysis models that incorporate individual and household-level control variables. The study will determine the elasticity coefficients of the impact of poverty determinants and evaluate changes in relative poverty indicators and their determining factors over the analyzed period.

## 2. LITERATURE REVIEW

There are several studies in the scientific literature (Nolan&Whelan, 2010; Figari, 2012; Nelson 2012; Notten, 2013, Notten&Guio, 2016; Weziak-Bialowolska, 2016; Guio, Marlier&Nolan, 2021; Burchi et al., 2022; Mussida&Sciulli, 2022; Franzen&Bahr, 2024), that examine the methods and reasons for measuring monetary poverty and material deprivation of the population. Several researchers and organizations have utilized the Multidimensional Poverty Index (MPI) in their studies to analyze and address poverty (Alkire&Santos, 2010; Alkire et al., 2023). The global Multidimensional Poverty Index (MPI) has been criticized for its lack of adequate theoretical

justification and its insensitivity to income inequality, as highlighted by Burchi et al. (2022). An important aspect overlooked by the current MPI is the absence of an employment dimension, which is crucial in evaluating poverty. Moreover, these multidimensional poverty indices are confined to the 15-65 age group, whereas income poverty indices are indicative of the entire household population.

Notten&Guio (2016) conducted a study on the impact of social benefits in addressing issues of income poverty and material deprivation within the populations of four countries - Germany, Greece, Poland, and the United Kingdom. They employed negative binomial regression analysis and least squares methods.

In Weziak-Bialowolska's (2016) study, the author investigates the disparities in multidimensional poverty across EU countries as well as within-country areas (urban and rural). The main issue addressed is the unequal distribution of poverty in terms of health, education, and living standards. The goal is to identify the most disadvantaged regions and understand the severity of poverty experienced by the poor. The research utilizes the Multidimensional Poverty Index (MPI) and its sub-indices: the Poverty in Health Index, Poverty in Education Index, and Poverty in Standard of Living Index. These indices offer detailed information on the proportion of people living in poverty and the severity of their deprivation.

The Guio, Marlier&Nolan (2021) study addresses the complex issue of poverty and social exclusion across European countries in 2007 - 2018. The study aims to enhance knowledge on a wide range of topics, including income inequalities, the role of social transfers, mortality risk due to poverty, intra-household variation in deprivation, housing conditions, unmet medical needs, child deprivation, and the living conditions of migrants. The study utilizes both cross-sectional and longitudinal data to construct multidimensional poverty indicators and to study the persistence and volatility of poverty over time.

The study by Mussida&Sciulli (2022) examines the changes in poverty dynamics in Europe before and after the Great Recession. The main goal is to analyze the factors contributing to poverty and how they have changed over time, with a focus on genuine state dependence and heterogeneity. The researchers utilized EU-SILC longitudinal data from two periods: 2005-2008 (pre-Great Recession) and 2015-2018 (post-Great Recession). They employed dynamic probit models that take into account endogenous initial conditions and correlated random effects to estimate genuine state dependence and identify the influence of observable and unobservable factors in determining the risk of poverty.

Franzen & Bahr's (2024) research aimed to update the long-term relative poverty rate development in 26 European countries from 2009 to 2018. The study included an analysis of the drivers of poverty at the country level using fixed effects panel regression analysis. Furthermore, the researchers were interested in exploring the relationship between short-term and long-term poverty rates.

Several scientists are interested in the issue, but there is a shortage of comprehensive comparative studies examining long-term changes in poverty rates within the population.

Nolan & Whelan (2014) summarize the findings of many researchers in this field, highlighting that income inequality significantly contributes to the perpetuation of poverty. A substantial income gap between different social groups restricts opportunities for lower-income individuals to invest in education, healthcare, and improved living conditions. Furthermore, a regressive tax system and limited social benefits impede income redistribution efforts that could help reduce poverty levels. The measurement of income inequality can be complicated by varying evaluations of how different sources of individual income contribute to overall inequality (Bezeredi, Mustać, & Urban, 2023). Therefore, it is essential to examine various socio-economic factors that influence income inequality and poverty. The following factors determining income inequality and poverty at the macroeconomic level are most commonly identified in scientific literature:

- Economic Instability: The aftermath of the Great Recession and the COVID-19 pandemic have significantly impacted economic stability, leading to increased AI poverty rates (Mussida&Sciulli, 2022; Franzen&Bahr, 2024).
- Inflation: Rising inflation, particularly in food and energy prices, has disproportionately affected low-income households, deepening material and social deprivation (Inflation increases ..., 2022).
- Employment and Education: The protective role of higher education has diminished over time, while employment stability and access to childcare have become increasingly important (da Costa&Dias, 2015; Weziak-Bialowolska, 2016; Mussida&Sciulli, 2022; Franzen&Bahr, 2024).
- Social Inequality: Discrimination and social exclusion based on race, gender, or disability continue to limit access to resources and opportunities (da Costa&Dias, 2015; Franzen&Bahr, 2024).
- Geographical Disparities: Poverty rates vary significantly across different regions, with rural areas and regions affected by conflict experiencing higher levels of poverty (Weziak-Bialowolska, 2016; Mussida&Sciulli, 2022; Alkire et al., 2023).
- Government Policies: Ineffective social protection programs and policies can leave vulnerable populations without adequate support (Halleröd et al., 2015; da Costa&Dias, 2015; Guio, Marlier&Nolan, 2021; Inflation increases ..., 2022).

Factors determining poverty at the microeconomic level:

- place of residence (e.g., city, village) (da Costa&Dias, 2015; Guio, Marlier&Nolan, 2021);
- household structure (Figari, 2012; Halleröd et al., 2015; da Costa&Dias, 2015; Guio, Marlier&Nolan, 2021);

- health status of the population and accessibility of health care (Halleröd et al., 2015; Weziak-Bialowolska, 2016; Guio, Marlier&Nolan, 2021);
- financial literacy and indebtedness of the population (da Costa&Dias, 2015; Guio, Marlier&Nolan, 2021), etc.

### **3. INDICATORS CHARACTERIZING THE RELATIVE POVERTY OF THE POPULATION AND THEIR CHANGES IN THE SCANDINAVIAN AND BALTIC COUNTRIES**

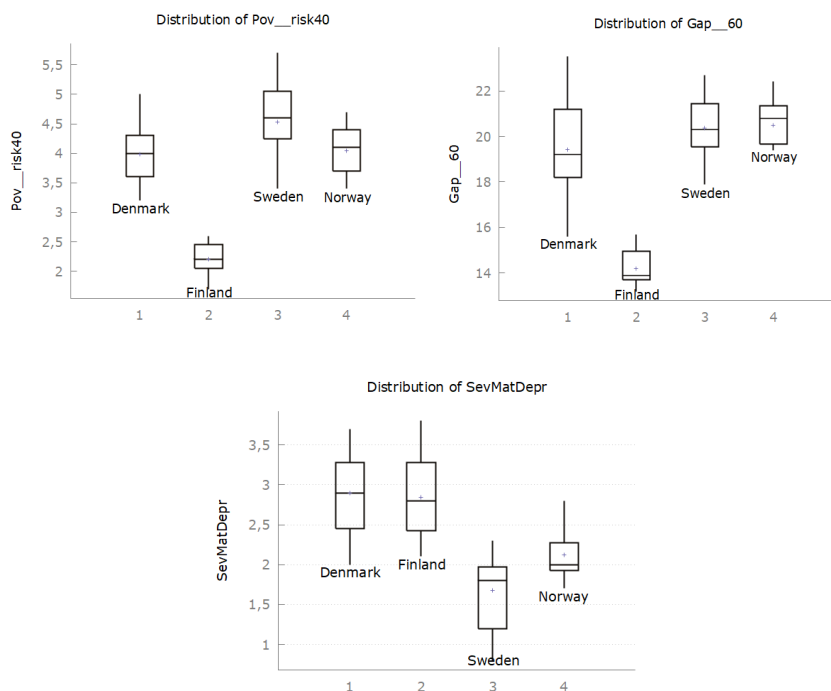
In this study, the intensity of poverty is reflected by three relative indicators: at-risk-of-poverty rate, at-risk-of-poverty gap and severe material deprivation rate. The at-risk-of-poverty rate is the share of people with an equivalised disposable income (after social transfer) below the at-risk-of-poverty threshold, which is set at 60 % of the national median equivalised disposable income after social transfers. This indicator does not measure wealth or poverty, but low income in comparison to other residents in that country, which does not necessarily imply a low standard of living (Eurostat Statistic Explain, 2021a). The relative median at-risk-of-poverty gap (cut-off point: 60 % of median equivalised income) is calculated as the difference between the median equivalised disposable income of people below the at-risk-of-poverty threshold and the at-risk-of-poverty threshold, expressed as a percentage of the at-risk-of-poverty threshold (cut-off point: 60 % of national median equivalised disposable income) (Eurostat Statistic Explain, 2021b). The severe material deprivation rate (SMD) is an EU-SILC indicator that shows the proportion of people whose living conditions are affected by a lack of resources. More precisely, material deprivation rates represent the proportion of people living in households that cannot afford a certain number of the following nine items:

- mortgage or rent payments, utility bills, hire purchase instalments or other loan payments;
- one week's holiday away from home;
- a meal with meat, chicken, fish or a vegetarian equivalent every second day;
- unexpected financial expenses;
- a telephone (including mobile telephone);
- a colour television (TV);
- a washing machine;
- a car;
- heating to warm the home adequately (Eurostat Statistic Explain, 2021c).

During the analyzed period, the at-risk-of-poverty rate (40) (when the poverty risk threshold is 40 % of disposable income) varied unevenly in the Scandinavian countries, but three countries showed an upward trend (see Figure 1),

except Finland, where the poverty rate during the period decreased to the lowest limit of 1.7 per cent at the end of the biggest changes in this group of countries when assessing the at-risk-of-poverty gap were in Denmark: this indicator increased by 3.6, in Sweden by 2.8, and in Norway by 2 per cent point. In Finland, the at-risk-of-poverty gap slightly decreased and remained the smallest, not only in Scandinavia but also among the smallest in the entire European Union. And only the severe material deprivation rate decreased in all four Scandinavian countries. It can be said that the share of the poor population in the Scandinavian countries is decreasing, but the average income of the poor is increasingly moving away from the poverty line.

Figure 1 Changes in the risk of poverty rate, gap and material deprivation of the population in the Scandinavian countries from 2005 to 2021 (in percentage)

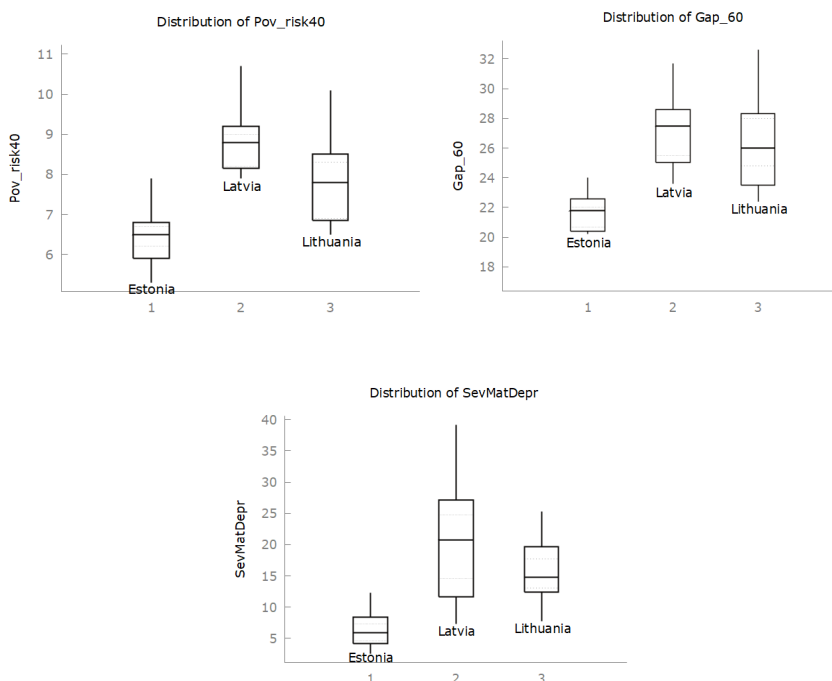


Source: composed by the authors based on EUROSTAT data.

In the Baltic countries, poverty indicators were significantly higher in the analyzed period compared to the Scandinavian countries. In 2020, the at-risk-of-poverty rate was almost twice as high, and the poverty gap was about 1.5 times higher. Severe material deprivation also showed a significant difference, with

Sweden at 1.8 per cent, and Latvia and Lithuania at 7.3 per cent respectively (see Figure 2). Overall, the trends for all poverty indicators are decreasing, except for Latvia where the at-risk-of-poverty rate slightly increased from 2005 to 2021. Estonia has the most stable situation among the Baltic countries, but even there, poverty levels are higher than in Scandinavia.

Figure 2 Changes in the risk of poverty rate, gap and material deprivation of the population in 2005 - 2021 in the Baltic States (in percentage)



Source: composed by the authors based on EUROSTAT data.

In conclusion, it can be stated that both groups of countries are characterized by a trend of poverty reduction, but due to the faster-growing income of the population in the Baltic countries, these processes are more intense.

#### 4. METHODOLOGY AND RESEARCH MODEL

Over the past two decades, research on the determinants of population poverty has utilised various methods to uncover the complex factors contributing to poverty. Quantitative approaches, such as econometric modelling and regression

analysis, have been widely used to analyse large datasets from national surveys and international databases. These methods help identify correlations between poverty and variables like education, employment, health, and social policies.

The current studies on poverty changes have used either static (Nelson, 2012; Notten & Guio, 2016) or relatively medium-term dynamic (Mussida & Sciulli, 2022) econometric models. These models allow for the inclusion of more explanatory variables and the analysis of effects at multiple levels (macro, household, individual), but they do not allow for the analysis of intergroup data variation over time. This possibility can be achieved by using regression analysis of panel data, which combines cross-sectional and time variables. It is important to incorporate lagged variables in the estimation models, as some exogenous factors, such as economic development, population, employment, or education, may have long-term effects.

In this study, the effects of the independent variables on the endogenous variable are tested using least squares (OLS) and fixed effects (FEM) methods. Since the effects of changes in variables were evaluated, the variables included in the models were standardized by taking their logarithms or differentiation. To validate the created models, the data were checked for autocorrelation using Durbin-Watson statistics and correlograms, as well as heteroskedasticity using the Wald test. The reliability of the models was evaluated by calculating the standard errors of variable coefficients, t and F statistics, and their probabilities.

This study aims to assess how certain factors contribute to poverty in two different countries. The impact of these factors on the poorest residents in four Scandinavian countries (Denmark, Finland, Sweden and Norway) and three Baltic countries (Lithuania, Latvia and Estonia) is compared. Due to missing data, Iceland was not included in the study. The research involves using descriptive statistics, comparative analysis, and panel data regression methods.

Macro-level panel data models were developed with three poverty indicators as dependent variables: the level of poverty risk (at thresholds of 40, 50, or 60 per cent of disposable income), the gap of poverty (Gap\_60), and the rate of severe material deprivation (SevMatDepr). Data from the European Union Statistics on Income and Living Conditions (EU-SILC, 2023) were used to estimate these indicators, which include monetary and material poverty. Notably, the study does not consider the impact of public social security services on reducing poverty and material deprivation. Impact assessment indicators and corresponding variables were selected based on previous empirical studies that highlighted the most influential factors that determine changes in population poverty. The controlled variables are described in Table 1:

Table 1 Selected variables description

Controlled variables	Description of the variable
The inflation ( <i>INFL_rate</i> )	The harmonised index of consumer prices (HICP), annual average index (Eurostat 2023a).
Gross domestic product per capita ( <i>GDP_pcap</i> )	Gross domestic product at market prices: the sum of added values of all economic activity at basic prices after adding taxes and subtracting product subsidies. GDP per capita (Eur) (Eurostat, 2023d).
Gini coefficient of equivalised disposable income ( <i>GINI</i> )	The Gini coefficient is defined as the relationship of cumulative shares of the population arranged according to the level of equivalised disposable income, to the cumulative share of the equivalised total disposable income they received (Eurostat, 2023i).
Households' gross debt-to-income ratio ( <i>Ndebt_toincr</i> )	Households' gross debt-to-income ratio is defined as debt, and liabilities divided by disposable income (Eurostat, 2023j).
Healthcare expenses ( <i>Healt_exp</i> )	Current expenditures on health per capita in current US dollars. Estimates of current health expenditures include healthcare goods and services consumed each year (WHOGH, 2021).
Long-term unemployment rate ( <i>LongUnem</i> )	The long-term unemployment rate represents the percentage of people unemployed for 12 months or more within the labour force (Eurostat, 2023k).
Education of the population by level ( <i>Edu_0_2</i> ); ( <i>Edu_3_4</i> ); ( <i>Edu_5_8</i> )	Share of the employed population by education levels (percentage). Population education levels 0 - 2, 3 - 4 and 5 - 8 according to the ISCED (2011) education level classification - higher than primary, basic and incomplete secondary education, upper secondary and post-secondary non-tertiary, and tertiary education (Eurostat, 2023l).

Source: prepared by the authors based on Eurostat Statistic Explain (2021) and World Health Organization Global Health Expenditure Database. [https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Thematic\\_glossaries](https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Thematic_glossaries); [https://www.who.int/data/gho/data/indicators/indicator-details/GHO/current-health-expenditure-\(che\)-per-capita-in-us-dollar](https://www.who.int/data/gho/data/indicators/indicator-details/GHO/current-health-expenditure-(che)-per-capita-in-us-dollar)

Six models were created to assess the impact in the Scandinavian and Baltic countries. These models all included the same independent variables and 17-time pseudo-variables. The regression analysis was conducted in three stages. In the first stage, three endogenous models were created to examine the impact of changes in income inequality (expressed as GINI) and GDP per capita ( $\beta$  coefficients) on changes in population poverty:

$$\Delta(Pov\_risk40(50)(60)_{it}) = \alpha + \delta_3 t d 2007_t + \dots + \delta_{17} t d 2021_t + \beta_1 \Delta(GINI_{it}) + \beta_2 \Delta(GDP\_pcap_{it}) + \beta_3 \Delta(GDP\_pcap_{it-1}) + \Delta \epsilon_{it}$$

$$\Delta(Gap\_60_{it}) = \alpha + \delta_3 t d 2007_t + \dots + \delta_{17} t d 2021_t + \beta_1 \Delta(GINI_{it}) + \beta_2 \Delta(GDP\_pcap_{it}) + \beta_3 \Delta(GDP\_pcap_{it-1}) + \Delta \epsilon_{it}$$

$$\Delta(MatDepr_{it}) = \alpha + \delta_3 t d 2007_t + \dots + \delta_{17} t d 2021_t + \beta_1 \Delta(GINI_{it}) + \beta_2 \Delta(GDP\_pcap_{it}) + \beta_3 \Delta(GDP\_pcap_{it-1}) + \Delta \epsilon_{it}$$

The effects were assessed for both groups of countries using Ordinary Least Squares (OLS) and Fixed Effects Model (FEM) methods.

In the second step, the models were modified by including an additional independent variable, the total household debt-to-income ratio ( $Ndebt\_toincR_{i,t}$ ) (Noten&Guio, 2016). The models are checked using OLS and FEM methods:

$$\Delta(Pov\_risk40(50)(60)_{i,t}) = \alpha + \delta_3 td2007_{i,t} + \dots + \delta_{17} td2021_{i,t} + \beta_1 \Delta(GINI_{i,t}) + \beta_2 \ln(Ndebt\_toincR_{i,t}) + \beta_3 \ln(GDP\_pcap_{i,t}) + \beta_4 \Delta(GDP\_pcap_{i,t-1}) + \Delta e_{i,t}$$

$$\Delta(Gap\_60_{i,t}) = \alpha + \delta_3 td2007_{i,t} + \dots + \delta_{17} td2021_{i,t} + \beta_2 \Delta(GINI_{i,t}) + \beta_3 \ln(GDP\_pcap_{i,t}) + \beta_4 \ln(GDP\_pcap_{i,t-1}) + \beta_5 \Delta(Ndebt\_toincR_{i,t}) + \Delta e_{i,t}$$

$$\Delta(MatDepr_{i,t}) = \alpha + \delta_3 td2007_{i,t} + \dots + \delta_{17} td2021_{i,t} + \beta_1 \Delta(GINI_{i,t}) + \beta_2 \ln(GDP\_pcap_{i,t}) + \beta_3 \ln(GDP\_pcap_{i,t-1}) + \beta_4 \Delta(Ndebt\_toincR_{i,t}) + \Delta e_{i,t}$$

In the third stage of the regression analysis, three specifications of each of the three basic models were made by additionally including the exogenous variables of unemployment and long-term unemployment, health care costs and population education ( $\lambda$  coefficients):

1.  $\Delta(Pov\_risk40(50)(60)_{i,t}); \Delta(Gap\_60_{i,t}); \Delta(SevMatDepr_{i,t}) = \alpha + \delta_3 td2007_{i,t} + \dots + \delta_{17} td2021_{i,t} + \beta_1 \ln(GINI_{i,t}) + \beta_2 \ln(Ndebt\_toincR_{i,t}) + \lambda_1 \Delta(Unemp_{i,t}); (LongUnem_{i,t}) + \lambda_2 \ln(LongUnem_{i,t-1}) + \lambda_3 \Delta((Pov\_risk40(50)(60)_{i,t-1}); (Gap\_60_{i,t-1}); SevMatDepr_{i,t-1}) + \Delta e_{i,t}$
2.  $\Delta(Pov\_risk40(50)(60)_{i,t}); \Delta(Gap\_60_{i,t}); \Delta(SevMatDepr_{i,t}) = \alpha + \delta_3 td2007_{i,t} + \dots + \delta_{17} td2021_{i,t} + \beta_1 \ln(GINI_{i,t}) + \beta_2 \ln(Ndebt\_toincR_{i,t}) + \lambda_3 \Delta((Pov\_risk40(50)(60)_{i,t-1}); (Gap\_60_{i,t-1}); SevMatDepr_{i,t-1})) + \lambda_4 \Delta(Healt\_exp_{i,t}) + \Delta e_{i,t}$
3.  $\Delta(Pov\_risk40(50)(60)_{i,t}); \Delta(Gap\_60_{i,t}); \Delta(SevMatDepr_{i,t}) = \alpha + \delta_3 td2007_{i,t} + \dots + \delta_{17} td2021_{i,t} + \beta_1 \ln(GINI_{i,t}) + \beta_2 \ln(Ndebt\_toincR_{i,t}) + \lambda_3 \Delta((Pov\_risk40(50)(60)_{i,t-1}); (Gap\_60_{i,t-1}); SevMatDepr_{i,t-1})) + \lambda_5 \Delta(Edu_{i,t}) + \Delta e_{i,t}$

Lagged GDP, GINI and poverty indicator variables were included in the study to test their effects on the models.

## 5. THE RESULTS OF THE RESEARCH

The following hypotheses were examined for the Scandinavian and Baltic groups:

Hypothesis 1: Economic growth reduces poverty. Current and lagged variables are included in the model.

Hypothesis 2: Income inequality increases poverty.

Hypothesis 3: Growth in healthcare benefits reduces population poverty. Current and lagged variables are included in the model.

Hypothesis 4: The growing share of household debt in disposable income reduces population poverty.

Hypothesis 5: Unemployment and long-term unemployment increase population poverty. Current and lagged variables are included in the model.

Hypothesis 6: increasing population education reduces population poverty.

## The results for the Scandinavian group:

Independent variable	At risk of poverty rate (40)				At risk of poverty rate (50)		Poverty gap (60)		Severe material deprivation rate	
	OLS	FEM	OLS	FEM	OLS	FEM	OLS	FEM	OLS	FEM
<i>Model</i>										
$\alpha$	-0.18 (0.404)	-0.18 (0.575)	-0.22 (0.376)	-0.23 (0.28)	-1.22 (0.618)	-0.084 (0.686)	0.189 (0.698)	0.183 (0.66)	0.192 (0.517)	0.311 (0.158)
td2007	0.253 (0.543)	0.302 (0.369)	-0.016 (0.964)	-0.017 (0.957)	-0.186* (0.087)	-0.132 (0.001)	0.169 (0.92)	1.147* (0.068)	0.001 (0.99)	-0.008 (0.978)
...	...	...	...	...	...	...	...	...	...	...
td2020	-0.14 (0.676)	-0.134 (0.653)	-0.116 (0.616)	-0.109 (0.61)	-0.354 (0.48)	-0.379 (0.4)	-0.587 (0.5)	-0.545 (0.495)	-0.013 (0.957)	-0.043 (0.855)
d_GINI			0.082 (0.421)	0.083 (0.385)			0.078 (0.785)	0.109 (0.698)		0.156** (0.015)
d_GDP_pc <sub>it-1</sub>			-2.268 (0.428)	-2.4 (0.366)			-1.649 (0.854)	-1.315 (0.868)		-3.25*** (0.004)
d_Ndebt_to_in cR <sub>it</sub>			0.002 (0.685)	0.003 (0.614)			-0.08*** (0.001)	-0.09*** (4.37e-010)	0.006 (0.277)	-0.012** (0.025)
ld_Healt_exp <sub>it</sub>									0.077 (0.378)	
ld_Healt_exp <sub>it-1</sub>			1.95*** (0.0004)	2.08*** (1.45e-023)						
d_LongUnem <sub>it</sub>	-0.022* (0.093)	-0.025** (0.02)			-0.015 (0.766)	-0.024 (0.665)			0.06** (0.074)	0.05*** (0.006)
d_LongUnem <sub>it-1</sub>							0.079 (0.28)	0.071 (0.423)		
d_Edu_0-2 <sub>it</sub>	0.23** (0.04)	0.245*** (0.003)								
d_Edu_3-4 <sub>it</sub>					-0.31*** (0.005)	-0.33*** (0.003)	-0.59** (0.04)	-0.594** (0.14)		
d_Edu_5-8 <sub>it</sub>					0.188*** (0.008)	0.158*** (0.009)			-0.204* (0.086)	0.32*** (9.58e-06)
d_Gap_60 <sub>it-1</sub> d_SevMatDepr <sub>it-1</sub>							0.56*** (0.007)	0.511*** (7.71e-08)	-0.315* (0.075)	0.345*** (0.001)
Log-likelihood	-13.094	-11.95	-20.177	-20.098	-32.07	-30.7	-113.75	-113.61	-18.676	-17.708
Test statistic:	Wald T: Chi-sq(4) = 15.8039 p-value 0.0033 VIF(j)=4	T statistic F(9, 30) = 0.66 p-value 0.583	Wald T: Chi-sq(4)= 18.697 = 0.031 p-value 0.0009 VIF(j)=9	T statistic F(3, 30.1) = 0.992	Wald T: Chi-sq(4) = 0.349 = 0.838 p-value = 0.986 VIF(j)=2.2	T statistic F(3, 30.5) = 0.483	Wald T: Chi-sq(4) = 94.56 = 0.076 p-value = 1.4137e- 019 VIF(j)=2	T statistic F(3, 29.4) = 0.972	Wald T: Chi-sq(4) = 21.102 p-value 0.0003	T statistic F(3, 27.7) = 0.436 p-value 0.729
Durbin-Watson	2.166	2.25	2.18	2.19	1.75	1.8	2.75	2.74	1.98	1.95
n	59	59	60	60	59	59	60	60	55	55

To confirm the hypotheses, the following conditions were tested:  $\beta > 0$ ,  $p > 0,05$ ;  $\lambda > 0$ ,  $p > 0,05$ . At least one  $\beta_{1,2,3,4} > 0$ ,  $p < 0,05$ ; At least one  $\lambda_{1-4} > 0$ ,  $p < 0,05$ .

Source: data processing conducted using the EUROSTAT data and GRETL software (2024).

When testing hypotheses  $H1$  and  $H2$ , no statistically significant relationship was found between changes in GDP per capita and income inequality and changes in poverty in Scandinavian countries. However, when testing the  $H3$  hypothesis, it was found that the growth of healthcare costs in the current period does not affect changes in poverty, but after considering the lagged variable of this indicator, a statistically significant relationship was found, reducing the risk of

poverty (with a poverty risk threshold of 40%). This relationship is present in both models.

For the *H4* hypothesis, it was found that as households' borrowing opportunities increase (increasing share of loans in total household income), the gap of poverty and deep material deprivation of the population of Scandinavian countries slightly decreases: when the debt-to-income ratio increases by 1 percentage point, indicators characterizing poverty decrease by 0.08 and 0.012 percentage point, respectively. The association found in the fixed-effects model was weak.

A small effect of long-term unemployment (hypothesis *H5*) was found only in fixed effects models and only for the level of poverty risk (with a poverty risk threshold of 40 per cent) and the variable of the level of deep material deprivation, but the direction of the effect is different: the growth of long-term unemployment reduces the level of risk of poverty and increases deep material deprivation. This is because of the relatively long payment of unemployment benefits related to previous income (up to 2 years in Norway and Denmark), which helps individuals to "rise" from poverty but is not sufficient to prevent the population from deep material deprivation.

The impact of changes in the population's education at different levels (hypothesis *H6*) was determined for the changes in all population poverty indicators. The share of less than primary, primary, and lower secondary education increases the poverty level of the population in Norway, while in other countries, as the population with the lowest education decreases, the poverty rate also decreases. Changes in the share of the population with upper secondary and post-secondary non-tertiary education have the greatest increasing effect on the risk poverty rate and gap of the population's poverty. This is because, in most countries (except Finland), this trend is decreasing. After it decreased by 1, the poverty risk rate increased by about 0.3, and the gap by 0.6 percentage points. The proportion of people with tertiary education increased in all Scandinavian countries, leading to greater income inequality and an elevated risk of poverty. This relationship was found to be statistically significant only when the poverty risk threshold was set at 40 per cent. Additionally, deep material poverty was confirmed to be related to the level of tertiary education only in the fixed effects model. Effects of changes in education were only found in models that included the lagged dependent variable as an additional independent variable.

## The results for the Baltic group:

Independent variable	At risk of poverty rate (40)		Poverty gap (60)			Severe material deprivation rate	
	OLS	FEM	OLS	FEM	FEM	OLS	FEM
Model							
$\alpha$	-18.3 (0.12)	-74.36* (0.083)	-2.3 (0.198)	-2.735 (0.038)	-2.814 (0.2)	0.141 (0.894)	-4.024 (0.443)
td2006			5.73* (0.08)		-1.23 (0.508)	-10.24 (0.15)	-8.39 (0.285)
td2007	-1.2 (0.384)	-2.34 (0.168)		-2.069 (0.266)			
...		...	...	...	...	...	...
td2020	-4.693* (0.056)	-8.353 (0.012)**	0.769 (0.684)	-5.86 (0.074)*	0.955 (0.612)	0.103 (0.906)	0.0005 (0.99)
d_GINI		0.5*** (0.004)			0.956*** (0.006)		
d_Ndebt_to_incR <sub>i,t</sub>	-0.177*** (0.008)	-0.153*** (3.02e-06)	-0.338* (0.052)	-0.382*** ( $<0.0001$ )		0.24 (0.389)	0.163 (0.59)
ld_GDP_pok <sub>i,t</sub>		8.81* (0.083)					
ld_GDP_pok <sub>i,t-1</sub>	0.2346* (0.092)				19.93*** (0.001)		
d_Unem <sub>i,t</sub>							-0.97*** (0.02)
d_LongUnem <sub>i,t</sub>	0.097** (0.039)		0.14** (0.04)				
d_Edu_0-2 <sub>t</sub>						1.36** (0.028)	
d_Edu_3-4 <sub>t</sub>			-0.98* (0.08)	-1.00*** (0.001)			
d_Edu_5-8 <sub>t</sub>						-0.786** (0.037)	-0.59** (0.046)
Log-likelihood	-57.8	-57.35	-91.256	-90.75	-87.645	-79.50	-77.35
Test statistic:	Wald test Chi-sq(3) = 28.528 p-value 2,813e-006 VIF(j)=9	T statistic F(2, 29.3) = 0.037 p-value 0.964	Wald test Chi-sq(3) = 5.874 p-value 0.118 VIF(j)=8	T statistic F(2, 93) = 0.321 p-value 0.728	T statistic F(2, 29) = 1.36 p-value 0.728	Wald test Chi-sq(3) = 0.033 p-value 0.998 VIF(j)=8	T statistic F(2, 28.0) = 0.0693 p-value 0.508
Durbin-Watson	2.26	2.45	2.15	2.18	2.66	2.06	2.11
n	48	48	48	48	48	45	45

To confirm the hypotheses, the following conditions were tested:  $\beta > 0$ ,  $p > 0,05$ ;  $\lambda > 0$ ,  $p > 0,05$ . At least one  $\beta_{1,2,3,4} > 0$ ,  $p < 0,05$ ; At least one  $\lambda_{1,4} > 0$ ,  $p < 0,05$ .

Source: data processing conducted using the EUROSTAT data and GRETL software (2024).

The Baltic countries have a greater data dispersion and heterogeneity compared to Scandinavia. For instance, Estonia is more similar to Scandinavian countries than to Latvia or Lithuania based on some indicators. However, panel data analysis models found less statistically significant relationships between variables.

When testing the *HI* hypothesis, it was found that the overall economic growth of the Baltic countries has a statistically insignificant relationship with the level of poverty risk. In one fixed effects model, it was established that a 1

percentage point increase in GDP per capita leads to an almost 20 percentage point increase in the poverty gap (60). This suggests that the added value created in these countries is unevenly distributed.

The testing of the *H2* hypothesis revealed that although income inequality slightly decreased in all Baltic countries, it grew in certain periods, leading to an increase in the poverty gap.

The testing of hypothesis *H3* did not find any statistically significant relationship with either the current or the lagged variables. This indicates that the increase in healthcare expenses does not reduce population poverty in the Baltic States, possibly because they are too small to have a significant impact on poverty reduction.

In addition, an increase in the share of household indebtedness relative to income (hypothesis *H4*) reduces population poverty, except for Latvia where this share decreases. In the Scandinavian countries, only the poverty gap decreases due to the increasing indebtedness of the population, whereas in Lithuania and Estonia, both the rate and gap of poverty decrease, with a stronger effect than in the Scandinavian countries.

Unlike the Scandinavian countries, in one of the models compiled for the Baltic countries, it was found that the increase in unemployment of the population reduces the deep material deprivation of the population (elasticity coefficient – 0.97). This is probably due to unemployment benefits, which are paid for 9 months (Lithuania, Latvia) or up to 12 months in Estonia. These benefits are tied to past earnings, so are often good enough cash support when you lose your job. It is different from long-term unemployment, which has significant social consequences for the unemployed themselves and negatively affects the entire society and the country's economic growth and public finances. Long-term unemployment is one of the causes of permanent poverty because after 9 or 12 months the financial and material situation of the unemployed population deteriorates significantly. Changes in long-term unemployment in the Baltic countries have a direct impact on changes in population poverty – 1 percentage point (hypothesis *H5* confirmed) with the increase in long-term unemployment, the poverty risk level of the population increased by 0.097 percentage points in the current period, and the gap of the poverty 0.14 percentage points. Although long-term unemployment decreased in all countries during the analyzed period, it is procyclical to socio-economic changes in the Baltic countries. It remains relatively high (more than 2 per cent), which may lead to greater poverty in the population.

In the Baltic countries, changes in the population's education improve less and less the monetary and material well-being of the population (hypothesis *H6*). In only one model a statistically significant inverse relationship between upper secondary and post-secondary non-tertiary education and the poverty gap (60) was determined. As stated by Mussida & Sciulli (2022), the protective role of higher education has diminished over time, while employment stability and childcare provision during early childhood have become more important.

## 6. CONCLUSIONS AND DISCUSSION

The assessing and monitoring poverty in Europe is vital for several reasons. Accurate data on poverty enables the development of effective policies and programs to improve living standards. Understanding where poverty is most severe allows for better allocation of resources to those in need. Addressing poverty can lead to greater social stability and cohesion, reducing the risk of social unrest. Additionally, monitoring poverty is essential for ensuring all citizens have access to basic human rights, such as food, shelter, and healthcare.

The World Bank has highlighted several key points regarding changes in the at-risk-of-poverty rates in EU countries in recent years. Impact of COVID-19: the COVID-19 pandemic significantly affected poverty levels, with an estimated increase in the number of people at risk of poverty due to economic disruptions. Economic Recovery: despite the initial increase, many EU countries have seen a recovery, with poverty rates beginning to decline as economies rebound. Inequality: the pandemic exacerbated existing inequalities, with vulnerable groups such as women, youth, and informal workers being disproportionately affected. Policy Responses: effective government policies and economic recovery plans have been crucial in mitigating the worst impacts of the pandemic on poverty and inequality. There has been progress in reducing poverty rates post-pandemic, but the recovery has been uneven. Continued efforts are needed to address the underlying inequalities.

A comparative analysis of the two groups of countries shows that the Baltic countries experienced faster changes than the Scandinavian countries. However, the changes in the Baltic countries were not as sustainable. Despite the faster-growing economies, decreasing long-term unemployment, and an increasing number of people with higher education, this did not ensure lower population poverty. Monetary and material deprivation is increasingly being compensated by loans, which can worsen the psychological condition of the population, increase fear about the future, and reduce trust in the state as a guarantor of security. Population education has a limited effect on poverty reduction and is slow and relatively expensive. Income inequality remains the main factor determining the risk and depth of poverty in the Baltic countries. At the same time, the changes in the Scandinavian countries were not as rapid as in the Baltic countries, but such important factors as poverty-reduction-oriented health and social security policies became more effective in reducing poverty.

**Author Contributions:** Conceptualization, R.B., L.S.; Methodology, R.B.; Formal Analysis, R.B.; Writing – Original Draft, L.S., Visualization, L.S.; Resources, R.B., L.S, Writing – Review & Editing, R.B., L.S.

**Funding:** The research presented in the manuscript received no external funding.

**Conflict of interest:** None.

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## **ODREDNICE I TRENDOVI SIROMAŠTVA STANOVNIŠTVA U SKANDINAVSKIM I BALTIČKIM ZEMLJAMA**

***Sažetak***

*Inicijativa „Održiva Europa do 2030.“ usklađena je s ciljevima održivog razvoja Ujedinjenih naroda (SDG) i usredotočena je na različite aspekte siromaštva, uključujući siromaštvo zbog nedostatka prihoda, socijalnu deprivaciju i sudjelovanje na tržištu rada. Istraživanja trendova siromaštva u zemljama s prosječnim ili iznadprosječnim prihodima ograničena su, ali nedavne socioekonomske promjene i neučinkovitost programa protiv siromaštva u tim regijama naglašavaju potrebu za njihovom provedbom. Ovo istraživanje koristi se regresijskom analizom panel podataka, konkretno modelima običnih najmanjih kvadrata i modelima fiksnih efekata, kako bi procijenilo granične učinke promjena u siromaštvu stanovništva te čimbenike koji na njega utječu. Istraživanje je pokazalo da, unatoč bržem gospodarskom rastu u baltičkim zemljama, smanjenju dugotrajne nezaposlenosti i rastu udjela visokoobrazovanih osoba, ti čimbenici nisu rezultirali nižim razinama siromaštva u usporedbi sa skandinavskim zemljama. Učinkovito smanjenje siromaštva u potonjoj skupini može se pripisati zdravstvenim i socijalnim politikama usmjerenima na smanjenje siromaštva, kao i manjoj nejednakosti u prihodima.*

***Ključne riječi: stopa rizika od siromaštva, jaz rizika od siromaštva, teška materijalna deprivacija, panel podaci.***

***JEL klasifikacija: I31, I32, H53; C33.***